

Description

RECEIVER LOCK

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of United States Patent Application No. 10/707,528 filed December 19, 2003 and further claims the benefit under 35 USC §119(e) of United States Provisional Application No. 60/484,127 file July 1, 2003, the entire disclosures of which are hereby incorporated by reference.

BACKGROUND OF INVENTION

[0002] Coupler locks, trailer locks or hitch locks are known in the art. These locks are designed to prevent the uncoupling of a trailer that is attached to a vehicle. One method of coupling a trailer to a vehicle uses a ball connector-type trailer hitch. In such a hitch, a trailer has a receiver at the end of the trailer neck for a ball connector which is attached to the vehicle. The receiver of the trailer fits over the ball connector of the vehicle. A latch attached to the receiver is closed, securing the trailer to the vehicle so

that it can be towed by the vehicle. In the absence of some type of coupler lock, the trailer receiver can often be easily and quickly unlatched and de-attached from the ball connector of the vehicle, by thieves for example, allowing for reattachment to another vehicle for the purpose of stealing the trailer and its contents. Coupler locks provide a way to secure the connection between trailer and vehicle such that it is not possible for the trailer to be removed from the vehicle without removing the lock.

[0003] A variety of types of coupler locks are available. However, such locks are not adjustable such that they can be used on latches of different widths. Furthermore, such locks are not always easy to install. Therefore, there is a need for new coupler locks that can be used on a variety of different sized latches and are easy to install.

SUMMARY OF INVENTION

[0004] The present invention provides an adjustable, stainless steel coupler lock that has a lock body and a shaft. The shaft is inserted into a closed latch of a trailer hitch and the lock body is slidably moved along the end of the shaft protruding from the latch. Positioned in this way, the latch of the trailer hitch cannot be opened. The lock body has a locking mechanism for locking and unlocking the device,

and a locking plate that engages the shaft. The shaft has a narrow end and a flange end, and also has multiple recesses located along the length of the shaft. Each recess has a vertical edge, that engages the locking plate and prevents movement of the shaft out of the lock body without opening the locking mechanism. Each recess also has a tapered edge that allows movement of the shaft further into the lock body without opening of the locking mechanism. The multiple recesses on the shaft provide for the coupler lock to be used on latches of different widths.

BRIEF DESCRIPTION OF DRAWINGS

[0005] The present invention may be more readily understood by reference to the following drawings wherein:

[0006] *Figure 1* is a photograph showing a perspective view of the assembled coupler lock of the present invention showing the shaft inserted into the lock body of the coupler lock and a key inserted into the keyway of the coupler lock;

[0007] *Figure 2* shows an exploded view of the coupler lock of the present invention;

[0008] *Figure 3* is a drawing of a side view of the coupler lock of the present invention showing the shaft inserted into the lock body of the coupler lock.

[0009] *Figure 4A* is a side view of the coupler lock.

- [0010] *Figure 4B* is a cross-sectional view of the coupler lock as taken through A-A as shown in Figure 4A.
- [0011] *Figure 4C* is a cross-sectional view of the coupler lock taken through B-B as shown in Figure 4A.
- [0012] *Figure 4D* is an end view of the coupler lock.
- [0013] *Figure 4E* is a cross-sectional view of the coupler lock taken through C-C as shown in Figure 4D.
- [0014] *Figure 5* is a drawing of the neck of a trailer, showing a latch in a closed position and a coupler lock attached to the latch such that the latch cannot be placed in an open position without removal of the coupler lock.
- [0015] *Figure 6* is a drawing of the neck of another trailer, showing a latch in a closed position and a coupler lock attached to the latch such that the latch cannot be placed in an open position without removal of the coupler lock.
- [0016] *Figure 7A* is an exploded view of a second embodiment of the present invention.
- [0017] *Figure 7B* is a perspective view of the embodiment shown in Figure 7A.
- [0018] *Figure 8A* is a perspective view of a receiver lock of the present invention with an end cap opposite the locking head.
- [0019] *Figure 8B* is a perspective view of a receiver lock similar to

that shown in Figure 8A, with a smaller shaft member.

[0020] *Figure 8C* is a perspective view of a receiver lock similar to that shown in Figure 8A, with a bent end piece.

[0021] *FIGURE 8D* is a side view of the receiver lock shown in Figure 8C.

DETAILED DESCRIPTION

[0022] Figure 1 is a photograph of the assembled coupler latch lock of the present invention, with a key inserted into the lock. Figure 2 is an exploded view of the coupler lock of the present invention. Referring to these figures, it can be seen that the coupler lock *10* comprises a lock body *20* and a shaft *30*. The lock body *20*, components that comprise the lock body, and the shaft *30* are preferably made of stainless steel, making the coupler lock resistant to corrosion.

[0023] The lock body is comprised of an outer lock housing *35*. The lock housing has a variety of openings. At one end of the lock housing *35*, there is a keyway *38*, into which a key *39* is inserted in order to open the lock. At the other end of the lock housing is an opening *42* for a housing cap *45*. On either side of the lock housing *35* are housing shaft openings *48*.

[0024] The lock housing *35* is the outer shell of the lock body *20*.

Various components fit into the interior of the lock housing 35, through the opening 42 for the housing cap 45, to yield the assembled lock body 20. One component that fits into the lock housing 35 is a locking mechanism 50. The locking mechanism 50 can be any of a number of types that are known in the art and can comprise a number of individual components that are not specifically indicated herein. For example, the locking mechanism 50 can be a pin-tumbler locking mechanism. In such case, the locking mechanism comprises components such as a cylinder plug, pin tumblers and optional sidebars, for example. The locking mechanism 50 may also be a wafer-tumbler lock, a push-button lock, or other types known in the art. The locking mechanism preferably is opened or unlocked through the use of a key 39 that is inserted through the keyway 38 of the lock housing 35. However, locking mechanisms 50 opened by other means, such as a numerical combination-type opening mechanisms, are possible. Whatever type of locking mechanism 50 is used, at one end of the mechanism is a means for engaging a cam 60. The means for engaging a cam is preferably a projection 62.

[0025] When fitted into the lock housing 35, one end of the lock-

ing mechanism 50 contacts, or is proximate to the keyway 38 of the lock housing 35. The other end of the locking mechanism 50 contacts the cam 60. The cam 60 is generally disc-shaped and has on one of its two faces a means for engaging the locking mechanism 64. The means for engaging the locking mechanism 64 is preferably a recess or groove in one face of the cam 60, although other means, such as, for example, an extension, notch, projection, gap opening, or arm can also be used. When the cam 60 is fitted into the lock housing 35, the cam groove 64 provides a space into which fits the projection 62 of the locking mechanism 50. On the other of its two faces, the cam 60 has a means 66 for engaging a locking plate 70. The cam means 66 for engaging the locking plate 70 is preferably a projection, although other means, such as, for example, an extension, notch, recess, gap, groove, opening or arm, can be used. A locking plate 70 also fits into the lock housing 35. One edge of the locking plate contacts the cam projection 66. As shown in Figure 2, the locking plate is of a thin, rectangular shape, although other shapes and configurations may also be used. In the center of the locking plate 70 is a generally circular opening 72, through which an inserted shaft 30 fits through the

lock body 20. Locking plate springs 74 engage an edge of the locking plate 70 and a housing cap 45. The springs 74 bias the locking plate 70 into a locking position, i.e. a position that prevents an inserted shaft 30 from being removed from the lock body 20. The edge of the locking plate 70 that contacts the cam projection 66 has a means 76 for engaging the cam. The means for engaging the cam is preferably a notch 76, although other means, such as, for example, an extension, projection, recess, gap, groove, opening or arm, can be used. The engagement of the locking plate 70 with the cam 60 allows for movement of the locking plate against the bias of the springs 74 when the correct key 39 is inserted into the lock and rotated. Such movement places the locking plate 70 in an unlocked position, i.e. a position that allows an inserted shaft 30 to be removed from the lock body 20.

[0026] A housing cap 45 is also fitted into the cap opening 42 of the lock housing 35. The housing cap 45 has a number of openings. One opening 80 is for fitting of the locking plate 70, springs 74 and cam 60. Another opening 83 is for insertion of the shaft 30 of the latch lock 10. The housing cap 45 holds in place the components of the lock body 20 which have already been described. The housing cap 45 is

held in place within the lock housing by any of a variety of means known in the art. In one embodiment, the securing means 85 is a set of screws or rivets inserted through the lock housing 35 into the housing cap 45.

[0027] The shaft 30 of the coupler latch lock 10 has a flange end 92 and a narrow end 94. Between the two ends of the shaft are numerous recesses 95. The number of recesses 95 is variable. The more recesses 95 there are on the shaft, the more adjustable the lock 10 is for latches 100 of different widths. Each recess on the shaft has two edges, a vertical edge 102 and a tapered edge 104. The vertical edge 102 of each recess 95 is nearer the narrow end 94 of the shaft 30 than is the tapered edge 104. The surface of the vertical edge 102 of the recess 95 is flat or substantially flat and perpendicular to the axis of the shaft 30. The tapered edge 104 of each recess 95 is nearer the flange end 92 of the shaft 30 than is the vertical edge 102. The surface of the tapered edge 104 of the recess 95 is preferably convex and is at an angle less than 90 degrees to the axis of the shaft 30. As discussed further herein, the angle of the tapered edge 104 provides for camming of the locking plate 70 when inserting the shaft 30 from the lock 10. Figures 3 and 4 show additional views of the inventive coupler lock.

[0028] The coupler lock 10 is operated as described below. The narrow end 94 of the shaft is inserted into an opening in the device 100 (e.g., the latch of a trailer hitch) that is desired to be locked or secured. The shaft 30 is pushed through the opening until it can be pushed any further, normally at the point where the flange 92 of the shaft contacts the device 100. The device is preferably a latch 100 of a trailer hitch 105, the latch securing the trailer to a vehicle. A ball receiver 107 is attached to the trailer neck 105 and the latch 100 provides a securing mechanism. The latch device 100 is preferably in the closed position, meaning, in the case of a trailer hitch, that the trailer cannot be disconnected from the vehicle without moving the latch to the open position. After insertion of the shaft 30 into and through the opening in the latch 100, the lock body 20 is attached to the shaft 30. This is done by moving the lock body 20 to a point where the narrow end 94 of the shaft enters and is inserted through the shaft opening 48 on one of the sides of the housing 35 of the lock body 20. The lock body 20 is designed such that the shaft 30 can be inserted into the lock body on either of the two sides of the lock body that has a shaft opening 48. When the shaft 30 is inserted into the lock body 20, the shaft ex-

tends through the shaft openings 83 in the housing cap 45 and through the opening 72 in the locking plate 70. The lock body 20 is slidably moved along the shaft 30 until the locking plate 70 within the lock housing 35 is aligned and engaged with one of the recesses 95 in the shaft 30. At such a point of engagement, the springs bias 74 the locking plate 70 into a position such that the edge of the locking plate opening contacts the bottom 106 and the vertical edge 102 of the recess 95. Preferably, the lock body 20 is slidably moved along the shaft 30 such that the locking plate 70 engages with a shaft recess 95 that is as close as possible to the flange end 92 of the shaft. The coupler lock is adjustable for latches 100 of different widths since the shaft of the lock has multiple recesses 95, each of which can engage the locking plate 70. However, it is preferable if the lock body 20 is positioned at a point along the shaft 30 such that the locking plate 70 engages the shaft recess 95 that is located closest to the latch 100. The tapered edge 104 of each shaft recess 95 provides a camming surface for the locking plate 70 such that the lock body 20 can be slidably moved along the shaft 30, in a direction toward the flange end 92, without the use of a key 39. The tapered edge 104 of the recesses allows bias-

ing of the locking plate 70 against the force of the springs 74 as the shaft 30 is slidably moved the lock body 20. It is also possible to unlock the locking mechanism 50, using a key 39 for example, and then slidably move the lock body 20 along the shaft 30 toward the flange end 92. When the lock body 20 is engaged in a shaft recess 95, it is not possible to then slidably move the lock body 20 in the opposite direction along the shaft (i.e., in a direction toward the narrow end 94 of the shaft) in order to remove the lock body 20 from the shaft 30. When the coupler lock 10 is so positioned, the latch 100 of the hitch cannot be opened and the trailer cannot be removed from the vehicle. Figures 5 and 6 show the latch 100 of a trailer hitch in the closed position and the coupler lock 10 attached, as described above, locking the latch in the closed position.

[0029] In order to remove the coupler lock 10, attached as described above, from the latch 100, the correct key 39 is inserted into the keyway 38 of the lock body 20. Insertion of the correct key 39 allows the locking mechanism 50 to be rotated by rotating the key. Rotation results in unlocking of the locking mechanism 50. Because the projection 62 of the locking mechanism is engaged with the groove 64 of the cam 60, rotation of the locking mechanism 50 causes

rotation of the cam 60 within the lock body 20. Rotation of the cam 60 in turn causes the cam projection 66, which is engaged by the notch 76 of the locking plate 70, to move the locking plate 70 in a direction opposite to the force of the springs 74. When the locking plate 70 moves, the edge of the locking plate opening 72 disengages the recess 95 on the shaft 30. When the locking plate 70 is positioned as such, the lock body 20 can be slidably moved along the shaft 30 in a direction opposite to that used to attach the lock 10 to the latch 100. Continued movement of the lock body 20 along the shaft 30 results in the shaft 30 being removed from the opening 48 in the lock body 20. Once the shaft 30 is no longer inserted into the lock body 20, the shaft can be removed from the opening in the latch 100. This allows the latch 100 to be moved from the closed position to an open position. In the open position, the trailer can be disconnected from the vehicle.

[0030] An advantage of the present invention is that the shaft 30 can be inserted from either direction, thereby allowing the user to insert the shaft through the housing cap shaft opening 45 from either side of the coupler. This is beneficial in that the shaft 30 can be inserted from different sides and using different hands, thereby allowing for easy

application of the coupler lock 10. The figures illustrate the variable widths available and the ability to have the shaft inserted from either side.

[0031] In another embodiment, the mechanics of the lock mechanism remain the same, including a locking mechanism 50, cam 60 and locking plate 70 which is actuated by a portion of the cam. In this embodiment, a shaft 30 is inserted into a side opening 120 in the lock housing 35. The shaft has a bent section 125 opposite of the side that engages the locking mechanism 50, thereby prohibiting the movement of the shaft 30 from the lock 10 from removal once applied.

[0032] The receiver lock 10 can be made in a variety of sizes, such as, for example one half inch and 5/8 inch, and can be made with an adapter, such as, for example, a one half inch to 5/8 inch adapter.

[0033] The springs 74 in the coupler latch lock 10 are oriented perpendicular to the axis of the cylinder assembly 50 and cam protection 66. This allows the locking lever 70, or locking plate, to move up and down to achieve the various locking positions. The springs in the receiver lock are oriented inline with the axis. This along with the cam surface on the extension allows the locking lever 70, or locking

plate, to be deadlocked in the locked position. The springs 74 keep the locking lever in contact with the extension so that when the cylinder assembly 50 is turned, the lever moves along the cam surface to the unlocked position and the hitch pin shaft can be removed.

[0034] Another aspect of the present invention is a seal 130 that is located on the exterior of the housing 35 of the receiver lock 10 around the shaft hole 120. This seal is secured to the housing by band 132 encircling the body. The seal is achieved by an opening 134 in the band with additional material extending into an opening in the housing that causes an interference fit between the seal 130 and the shaft 30. The seal 130 reduces the amount of water and debris that can enter into the lock mechanism 50. Water and debris in the lock mechanism can effect the performance of the lock.

[0035] In another embodiment, shown in Figures 8A–8C, the receiver lock 10 includes a locking head 150 that receives shaft 30 along an end 152 of the locking head. The end 152 includes a protective covering 155 that is preferably an elastomeric material which snaps onto the end of the locking head 150. In other embodiments the protective covering 155 is integral, is made of a comparable material,

or attaches by some other means, such as affixed by adhesive, form fit, or secured with retention means. In one embodiment, the protective covering 155 includes an internal groove that snaps into a corresponding external groove in the end of the lock head 150. The protective covering 155 has a hole or aperture 158 that is sized to provide interference fit with the shaft 30, thereby sealing the internal components of the locking head 150. The protective covering 155 preferably provides a seal against the locking head 150 to ensure water and debris does not enter the internal portion of the locking head 150. When the shaft 30 is inserted into the locking head 150, the material of the protective covering 155 becomes compressed and provides a barrier along the shaft 30 as well as the locking head 150, thereby excluding water, dust, dirt and debris from the internal lock mechanism. As shown in Figures 8A–C, the internal locking mechanism includes a lock cylinder 160 which can be operated by a key or other mechanism. The receiver lock 10 may include shafts of various sizes, an end cap 170 or a bent or radiused end 172, and an optional protective cap 174.

[0036] In another embodiment, the shaft 30 of the receiver lock 10 can be covered in a protective material 140 that pre-

vents scratching the surface of the lock or the object to which it is applied, such as a trailer coupler. As shown in the figures, this coating can either cover only a portion of the shaft 30, or cover the entire shaft (not shown). Optionally, a cap 145 can be used to provide protection to the lock cylinder from the surrounding elements.